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ABSTRACT

The Dallas Independent School District uses a multi-step computerized scheduling system to optimize the student's ability to schedule the courses he wants. Four distinct steps are involved: 1) course offerings are defined; 2) student requests are enumerated; 3) schedules are prepared, based upon requests; and 4) students are put into the schedule. A series of computer programs entitled Budget ESTimation (BEST) is employed to assist the secondary principal in dealing with budget preparation, teacher requirement estimates, and schedule making. BESTcloses the time lapse between schedule and personnel projections in relation to budget preparation, providing the administrator with useful data such as on-line student request input and output consisting of line printer budget and schedule working charts. (Author/LB)

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Budget ESTimation (BEST)

James H. Turk

Dallas Independent School District

DESCRIPTION

BEST is a series of programs meant to assist the secondary principal in budget preparation, teacher requirements, and schedule making in a timely manner. The purpose of BEST is to assist the principal by closing the time lapse between schedule and personnel projections in relation to budget preparation. The system employs on-line student course request input, and the output is line printer budget and schedule working charts for the principal.

THE PROBLEM

Currently, budget proposals are generally based upon last year's expenses. The budget proposal usually includes padding added to last year's budget to cover contingencies and changes in the faculty that are not known at the time of budget preparation. It would be nice to eliminate the padding effect which makes a mockery of the budget system itself.

Dallas uses a multi-step computer scheduling system where the schedule is fitted to the student body, and not the students to the schedule. This means that there are four distinct steps to scheduling:

1. Course types to be offered are defined.
2. Student requests courses desired.
3. Schedules are prepared, based upon requests.
4. Students are put into the schedule.

After the second step, the number of teachers and sections required is frequently determined by hand tally, or merely by guessing based upon last year's schedule. Due to time lags in producing machine readable data from course requests by the students, little information is available when the budget must be prepared.

Another problem of the same nature occurs in the faculty in that no quantitive information is available to describe next year's teacher salaries. The budget problem is two fold:

1. How much will the teacher salaries be next year?
2. How do you get machine readable course requests for budget preparation?

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AN ATTACK ON THE PROBLEM

Teacher Salaries

The old way of projecting salary was to use last year's salary, or perhaps to raise everyone one pay step, or even just add 5% to last year's cost. An application of the PERSIM model developed by the DISD, (see accompanying paper) allows a probablistic estimate of what the actual teachers at a school will do in the following year as well as their projected salary. Since any probablistic projection is subject to wide variation when applied to a small sample, only the simple variables are used in the projection. Teacher salary and terminations are projected using pay grade, experience, race, sex, and the level of the school. There are notable and distinct differences in longevity of teachers with respect to these areas. A special version of the PERSIM model is applied to the roster of teachers at the school under study, and a projection is made for the principal's use (see Figure 1).

Course Requirements

At present, the student requests are available in manual form at budget time, but not in machine readable form. To try to eliminate the time lag and hand work in manual counts, shuffling, bubbling, and copying, an on-line teletype system was attempted. This teletype, at the school during student course request time, allowed entry of course request information at the time the student was talking to the counselor. This on-line response gave request errors immediately, was able to correct demographic data when the student was available for reference, and gave immediate information on course tallies, conflict matrix, and unscheduled students. The following paragraphs and figures describe the on-line portion of the BEST course request gathering program, including advantages and examples.

A number of advantages were found to result from the on-line BEST system:

Eliminate all bubbling
Eliminate tally and counting
Update demographic data
Instant validation of data
Error correction on line
Budget planning timely
Advisory rosters
Student lists
Instant conflict matrix
Eliminate checking transaction register

Program options include:

Student requests,
Change course offerings,
Schedule all students in a grade,
Change one course number,
List students requesting a course,
List students with errors, and
Line printer listings.

XXX JUNIOR HIGH SCHOOL
TEACHER ROSTER

No.	SSN	NAME	RACE	SEX	DEGREE	EXP	LOC EXP	ACTUAL SALARY	TABLE SALARY	NEXT YR SALARY
1.	161288654	GLADYS S SARTIN	A	F	BACHL	8	4	8260	8260	8610
2.	179346206	MICHELE K KRANZ	A	F	BACHL	6	6	8960	8960	9310
3.	233323330	REEVES F FULTON	A	M	MASTR	22	22	12040	12040	12040
4.	256783324	CASSIE M ISAAC	B	F	MASTR	33	3	12040	12040	12040
5.	460100012	RAIME G MUGUERZA	M	M	BACHL	4	3	8760	8520	8880

NUMBER OF TEACHERS THIS YEAR - 98
COST OF THIS YEARS TEACHERS ACCORDING TO THE STANDARD TABLE $ 943810
BASED UPON A TEACHER BASE SALARY OF $ 7000, THIS GIVES AN
AVERAGE SALARY OF $ 9631

ESTIMATED NUMBER OF TEACHERS THAT WILL TERMINATE NEXT YEAR 9.6
ESTIMATED COST OF REMAINING TEACHERS $ 864590

FROM THE CLASS SCHEDULE ABOVE THERE IS A NEED FOR THIS
MANY TEACHERS - 96

ESTIMATED NUMBER OF TEACHERS TO HIRE - 7.6
AT AN AVERAGE COST OF $ 7660.
ESTIMATED TOTAL COST OF TEACHERS NEXT YEAR $ 957600
GIVING AN AVERAGE SALARY OF - $ 9752

Figure 1

SAMPLE
COURSE OFFERING

NO.	SEX	GD	PC	TITLE
100		7	2	ENGLISH 7
105		7	2	ENGLISH 7-R
110		8	2	ENGLISH 8
200		7	2	MATH 7
210		8	2	MATH 8
300			1	STUDY HALL
310	B		1	P.E. ROY
315	G		1	P.E. GIRL
350			2	HOMEMAKING
420	B		2	SHOP
500		7	2	SOCIAL STUDY 7
510		8	2	SOCIAL STUDY 8
600			2	ART
650			2	MUSIC

Figure 2

TYPICAL STUDENT COURSE REQUEST

```
?JOHN  ALBA-

 948275 JOHN    C ALBA
 GUARD- IRENE   B ANDREWS
5432 WATER AVE
DALLAS       75204    PHONE 5221178
SEX=B  RACE=M   GD= 7  ADVISOR= 14

? 110,210,300,310,420,600*-

NO-SEM PC   T I T L E
110     2 ENGLISH 8
210     2 MATH 8
300     1 STUDY HALL
310     1 P.E. BOY
420     2 SHOP
600     2 ART


?       .       (READY FOR NEXT ENTRY)
```

NOTE: ONLY UNDERLINED ENTERIES ARE MADE BY OPERATOR

Figure 3

Figure 2 reflects a course offering which is displayed to the student. The student then initiates a course request (Figure 3).

On line functions provided in the system include:

Add and delete students
Change student demographic data
Select one semester only
Student identification
Error messages
- Sex incorrect for course
- Course not offered
- Grade level incorrect
- Course selected twice
- Period control incorrect
- Student inactive
- Active student not yet scheduled

An example of on-line student identification follows:

You can use -
- I.D. number (assigned by the district)
- Name
  Last name only
  First initial and last name
  Full name
  Last name in brief form (6 characters only)

Such as:
? 947368-
? ESPINOZA-
?J ESPINOZA-
?JOHN ESPINOZA-
?JOHN Q ESPINOZA-
?JOHN ESPINO- (Brief form)

The information specifically meant for principals is listed in Figure 4 through 6. These figures represent information the principal must know before accurate budget preparation and scheduling can be complete. The information is presently calculated by hand by most principals, and is often duplicated with corresponding errors and confusion when the schedule is prepared.

Figure 4 is a chart telling the number of students requesting a course and the number of sections required at various class sizes. Data is given for the range of class sizes specified for that particular course, and the optimum size is used for cost estimates.

Figure 5 is a chart of actual class size (pupil/teacher ratios) centered around the optimum number of classes. This chart is meant to assist the principal in adjusting the schedule by one or two sections in particularly sensitive courses.

Figure 6 is a matrix showing students who have requested potentially concurrent courses. This conflict matrix allows the principal to avoid scheduling 1 and 2 section courses at the same time

when students have requested both courses. This is a schedule building tool, not a budget tool.

It should be noted that all variables in the above figures are set at the user's discretion. Class offerings, minimum, maximum, and optimum class size, tabulated class size, teacher cost and factoring of pupil enrollment by grade are available options as well as combining courses (such as a Spanish 4 and a Spanish 5 class), expanding grouped courses, and subtotals of cost for course groups is available at used discretion. All the information presented is a work sheet for the principal in projecting the budget. Obviously, each school has unique problems which must be manually accounted for, but the tedium of hand calculations is avoided and ready charts are available as tools for the principal through the BEST program.

XXX JUNIOR HIGH SCHOOL

No.	Title	Min/Max/Opt	Pup	Class Size 15	20	25	30	35	40	60	80	99	Min	Opt	Opt Cost
100	English 7	15/35/30	496	33	25	20	17	14	-	-	-	-	14	17	$ 32300
105	English 7-R	15/30/25	106	7	5	4	4	-	-	-	-	-	4	4	$ 7600
110	English 8	15/35/30	385	27	19	15	13	11	-	-	-	-	11	13	$ 24700
200	Math 7	15/35/30	460	30	23	18	15	13	-	-	-	-	13	15	$ 28500
210	Math 8	15/35/30	340	22	17	13	11	10	-	-	-	-	10	11	$ 20900
300	Study Hall	60/99/99	950	-	-	-	-	-	-	15	12	9	9	9	$ 17100
310	P.E.Boy	40/99/80	460	-	-	-	-	-	11	8	6	5	5	6	$ 11400

Grand Totals	Min Classes	100	$ 190000
	Opt Classes	144	$ 273600

The costs are based upon an average teacher salary of $ 9500

28.8 teachers are required when each teacher teaches 5.0 classes

26.8 overall pupil-teacher ratio for 772 students

Figure 4

PUPIL TEACHER RATIOS

No.	Title	Pupils	Min Sect	Opt Sect	Pupil/Teacher Ratios 2 Less	1 Less	Opt No.	1 Addl	2 Addl
100	English 7	496	14	17	33.1	31.0	29.2	27.6	26.1
105	English 7-R	106	4	4			26.5	21.2	17.6
110	English 8	385	11	13	35.0	32.1	35.0	27.5	25.7
200	Math 7	460	13	15	35.4	32.9	30.7	28.8	27.1
210	Math 8	340	10	11		34.0	30.9	28.3	26.2
300	Study Hall	950	9	9			105.6	95.0	86.4
310	P.E.Boy	460	5	6		92.0	76.6	65.7	57.5

Figure 5

XXX JUNIOR HIGH SCHOOL
CONFLICT MATRIX

Course No. & Title	1005	6005	6505	7205	8005	....
105 English 7-R	26	9	0	0	0	....
600 Art	9	58	0	25	14	....
650 Music	0	0	29	0	1	....
720 Homemaking II	0	25	0	26	0	....
800 Spanish	0	14	1	0	35	....
....						

Figure 6